

NAVY MEDICINE

January-February 1999



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COVER: Physicians conduct an emergency tracheostomy at San Diego's Mercy Hospital. A new partnership between Mercy Hospital and Naval Hospital Camp Pendleton, CA, is under way helping Navy personnel train and maintain their surgical skills at a level I trauma center. Photo by CAPT Michael J. Sise, MC (Ret.). Story on page 4.

DNA Sequencing of Malaria Chromosome

Malaria is the most important tropical infectious disease in the world today resulting in 300–500 million cases and over 2 million deaths annually, most occurring in sub-Saharan Africa. Currently, malaria is a medical threat to U.S. troops deployed to the tropical regions of Africa, Asia, South and Central America, and the Pacific. Sailors, Marines, and Soldiers deployed to these regions are at risk.

In the war against malaria, the vanguard of malaria research for the Navy is centered at the Naval Medical Research Center (NMRC), Bethesda, MD. Navy researchers there are focusing on the genetic makeup of the malaria parasite in an effort to understand the parasite's biology as it progresses through a very complex life cycle in the human body.

The NMRC research team recently completed the DNA sequence, the genetic blueprint, of an entire chromosome from the human malaria parasite, *Plasmodium falciparum*. This is one of the 14 chromosomes that make up the *P. falciparum* genome and is the first from a malaria parasite that has been completely sequenced. The team's research, funded by DOD and NIH, is a milestone in the fight against malaria. The findings were published in the 6 Nov 1998 issue of *Science*. CAPT Stephen Hoffman,

MC, the director of the malaria program at NMRC and the team's leader said, "The purpose of this study was to determine if it was actually feasible to sequence in entirety a malaria parasite chromosome. This research provides the foundation for the arduous task of completing this genomic sequence. This research provides the first insight into the parasite's potential vulnerability based on a complete blueprint."

CDR Daniel Carucci, MC, NMRC's principal investigator on the team, explains why their research project is important, "The best way to get at the mechanisms the parasite uses to live and to survive in humans is to uncover its entire genetic blueprint. This genetic blueprint is much like the blueprints factories use to produce machinery. What parts are made, how they are put together, and how the entire machine will function can be determined from looking at the blueprints. If one wanted to disrupt a critical component of a car, one could look at the blueprint and determine that the drive train would be a better target than the air-conditioning system. That determination can be made solely from looking at the blueprints. Obviously, malaria parasites are more complicated than that and the interaction between humans and malaria parasites is very complicated; however,

we believe that our best chance at combating malaria is through the complete knowledge of the genetic blueprint."

The chromosome sequenced by the Navy researchers represents 1 million pieces which includes 210 genes, just 3 percent of the entire malaria genome, but significant enough to provide insight into the parasite's evolutionary origins, the unique biochemical pathways, and the potential mechanisms for evasion of a human's immune system. With this completed chromosome sequence and the future completion of the entire malaria genome sequence, the researchers will have at their disposal the potential to revolutionize the development of new, safe, inexpensive, and effective treatments and prevention against malaria.

CDR Carucci points out, "When the complete genome sequence for the malaria parasite is known, we will know every potential drug target, every potential vaccine target, and have at our fingertips the map to all of the biochemical pathways and regulatory systems that the parasite possesses. This means that we can have information never before known, on a scale never before achieved that should lead us to the rapid development of antimalarial drugs and vaccines."

This research is years away from producing a vaccine or bedside treat-

CDR Daniel Carucci and fellow researcher Dr. Adam Witney conduct research at NMRC. They and other team members successfully completed the DNA sequence, the genetic blueprint, of an entire chromosome from the human malaria parasite, *P. falciparum*.



ment, but this does not minimize the value or the excitement of the findings. The Navy team made a major leap forward in the war against malaria.

For the U.S. military, malaria has caused more casualties than bullets in every campaign fought during this century where malaria was transmitted. CDR Carucci illustrates the significance of the disease and the reason for his team's efforts and their commitment, "In World War II there

were 12 million man-days lost due to malaria, in Vietnam 1 million man-days were lost. More importantly, entire divisions were rendered incapacitated due to malaria. Field commanders often were unable to execute battle orders due to the threat. Some units suffered a 25 percent casualty rate within the first few weeks of a campaign because of infection with malaria."

Mosquitoes transmit the malaria parasite. The parasite, resistant to many drugs, and the mosquito, resistant to many insecticides, have contributed to a resurgence of malaria in

many parts of the world. The female anopheles mosquito, the variety that carries malaria, tends to bite after dark. Once in the bloodstream the parasites rapidly make their way to the liver. For 6 days the parasites multiply in the liver where one parasite becomes thousands. The parasites burst out of the liver and into the bloodstream and enter red blood cells. They multiply again, rupturing the cells as they increase and invade other red blood cells. People infected with malaria parasites frequently suffer fever, chills, headaches, and fatigue. In severe cases, *P. falciparum* infections

can cause coma and death.

The Navy has collaborated for 3 years with an international consortium of scientists, including those from the Institute for Genomic Research and the National Center for Biotechnology Information, Stanford University and with the Sangre Centre in the United Kingdom to complete the sequencing of the entire malaria genome. Funding was provided from NIH, the DOD's Military Infectious Disease Research Program, the Burroughs Wellcome Fund in the United States, and the Wellcome Trust in the United Kingdom.

In addition to CAPT Hoffman and CDR Carucci, the team includes from the Navy the paper's first author Dr. Malcolm J. Gardner; Drs. Herve Tetley, Lead Cummings, Steven

Salzburg, Granger G. Sutton, Owen White, Hamilton Al Smith, Claire M. Fraser, Mark D. Adams, and J. Craig Venture of the Institute for Genomic Research; Drs. L. Arrived and Eugene V. Konan of the National Center for Biotechnology Information; and Drs. Junking Jingo, Christopher Aston, Gong Al, and David C. Schwartz of New York University. □

—Story by Doris Ryan, Medical Research and Development Division (MED-26), Bureau of Medicine and Surgery, Washington, DC.

A Milestone in Developing DNA Vaccine

A Navy-led team of researchers has successfully tested a DNA vaccine in healthy humans, a significant milestone in medicine's fight against many deadly diseases. While DNA vaccines showed impressive results in previous animal studies, this DNA vaccine is the first to be successful in healthy humans.

DNA vaccines have the potential to prevent a wide variety of the most common infectious diseases, such as malaria, AIDS, dengue fever, and tuberculosis; highly fatal diseases, such as Ebola and Lassa fever; biological warfare threats; and cancer.

The team, headed by Navy CAPT Stephen Hoffman, MC, is based at Naval Medical Research Center (NMRC), Bethesda, MD. An article on the team's research is in the 16 Oct 1998 issue of *Science* magazine.

"The purpose of this study was to determine if DNA immunization is safe, well-tolerated, and generates an immune response in normal humans," said CAPT Hoffman. "We established this, so our next step is to develop a vaccine that will provide protection."

Hoffman's team and researchers from Vical, Inc., the U.S. Army Medical Research Institute of Infectious Diseases, and Pasteur Connaught (Phone-Poulenc Group), immunized 20 healthy volunteers with a malaria vaccine. The majority developed potent "killer" T-cells, which defend the human body against the disease.

"We used malaria as a model system to test this exciting new technology because it is the most important infectious disease threat to our operating forces," said Hoffman. "The significance of this demonstration, however, is in the proof of principle that allows us to advance toward a new era in vaccines."

NMRC began researching DNA vaccines more than 6 years ago as part of its mission to combat health threats to military members. Malaria is one of the major threats to American military forces. The disease threatens billions and afflicts 300 to 500 million individuals worldwide each year.

While licensing of a DNA vaccine for any disease is still years away, this is a major step forward. According to many experts, including Sir Gustav Nossal of the Children's Vaccine Initiative Scientific Advisory Group of Experts, these next generation vaccines may revolutionize immunization.

"DNA vaccines have made their explosive entry (into medicine), possibly signaling a revolution in vaccinology based on their ease of production, stability, and simplicity of combination," wrote Nossal in a *Nature* magazine's *Medicine Vaccine Supplement*.

The Navy has collaborated for 5 years with Vical, Inc., a San Diego, CA, biotech company that discovered

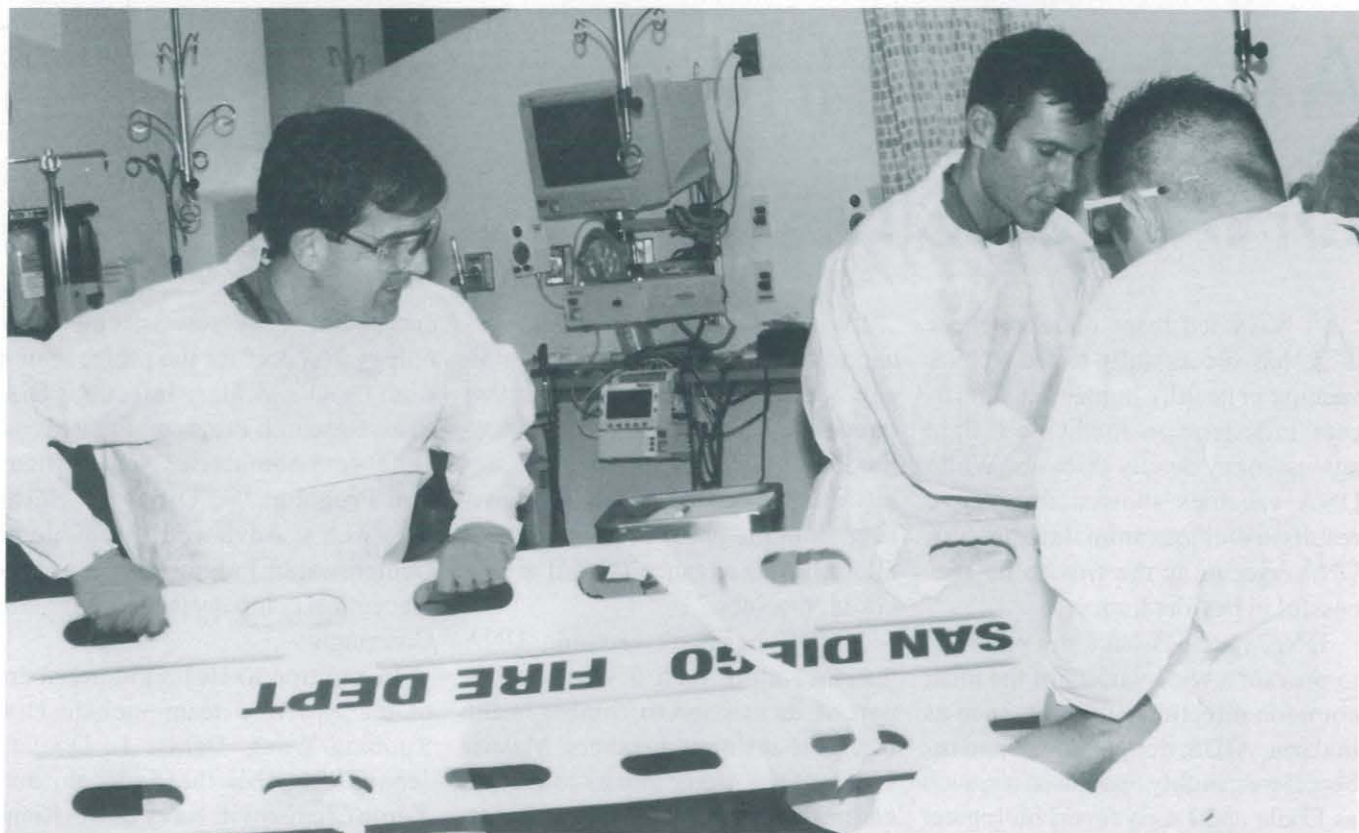
and patented the new vaccine technology. Support for the project came from DOD's Military Infectious Diseases Research Program, the Federal Defense Laboratories Diversification Program, the Office of Naval Research's Advanced Technology Demonstration Program, and the pharmaceutical company Pasteur Merieux Connaught.

In addition to Hoffman, members of the NMRC's team include Drs. Ruobing Wang, Denise L. Doolan, Jennifer Ng, Martha Sedegah, and Yupin Charoenvit; Navy CDRs Richard C. Hedstrom, Thong P. Le, Walter Weiss, and Trevor Jones. Army CAPT Kevin Coonan of the U.S. Army Medical Research Institute of Infectious Diseases; Drs. Jon Norman, Peter Hobart, and Michael Margalith of Vical, Inc.; and Charles De Taisne of Pasteur Merieux Connaught were also on the team.

The researchers also indicated potential relief for highly fatal diseases, such as Ebola and Lassa fever; biological warfare threats; and cancer. The Navy-led team recently tested a DNA malaria vaccine in healthy humans, a significant milestone in medicine's vaccine research effort. □

—Story by Doris Ryan, Medical Research and Development Division (MED-26), Bureau of Medicine and Surgery, Washington, DC.

Below: "The patient arrives." Mercy Hospital's Dr. Michael Sise (left) and Dr. Gary Schwendig of Naval Hospital Camp Pendleton (center)



NHCP Surgeons Get Level I Trauma Access

Naval Hospital Camp Pendleton (NHCP), CA, and Mercy Hospital, a level I trauma center in San Diego, CA, have established a frontline surgical program that helps keep NHCP's Navy surgeons at level I trauma certification. Moreover, this program has a profound effect on maintaining combat readiness for the Navy's surgical staff by enabling

NHCP general surgeons to train and maintain their skills at a civilian hospital, which is a level I trauma center with a high influx of severe trauma cases. How do they do this? By performing side-by-side trauma surgery with Mercy Hospital surgeons.

The prior two naval hospitals that established similar programs are San Diego and Portsmouth. Moreover, this

training responsibly addresses any hospital commanding officer's question of "How well prepared are we to go to war?"

CDR Wayne Weiss, MC, head of the NHCP's general surgery department, forged the connection between the Naval Hospital and Mercy Hospital. Mercy Hospital, it turns out, was not new to the idea. Dr. Richard



Dr. Schwendig (center) and his team prepare a trauma patient for surgery.

Virgilio, a Vietnam-era surgeon and Mercy's most prominent trauma surgeon, first opened the door to San Diego Naval Hospital's staff surgeons in 1993 after he retired from the Naval Hospital as a captain in the 1980's. Dr. Virgilio navigated the flow of connecting careers for this maiden voyage program.

Regardless of his Navy success, Dr. Virgilio is credited with having set up a nationwide trauma system. While building a joint history of providing medical services to the local community, what makes this program unique is the educational opportunity Mercy Hospital has extended to military personnel. Director of Trauma Services,

Michael J. Sise, M.D., who heads the program, is also a retired Navy surgeon. He was once chief surgeon aboard USS *Guam* and USS *Iwo Jima* during operations Desert Shield and Desert Storm in 1990 and 1991. Sise knows how important it is for civilian hospitals to share their state-of-the-art skills with those who must constantly be ready for war.

CAPT Joel Tobiason, director for surgical services at NHCP, was very pleased to see the program begin. "We dispatched our first surgeon, LCDR Eric Kuncir to Mercy Hospital on 12 June 1998. NHCP surgeons continue to hone their trauma skills with the collaborative efforts of the

level I trauma center. This enhances one of the goals of NHCP—to be ready to support the operational and contingency requirements of the Navy and Marine Corps team." Kuncir, himself a board-certified surgeon, added his impressions of the program. "We all get extensive trauma training as surgical residents. Those skills were ready on a moment's notice while operating on the aircraft carrier USS *Carl Vinson* (CVN-70), prior to reporting to my shore-based command. So it's a good feeling to be back in the trauma forefront of a high-risk environment again."

The next surgeon dispatched from NHCP to the Mercy Hospital pro-

Dr. Richard Virgilio (second from left) leads the way through emergency tracheostomy with Dr. Schwendig.



vative twist though. After interviewing the senior staff it occurred to me that this group lives like a second ago is past history. There was no twilight twinkle in their eyes, no talking in tandem about how things used to be when they were "in." Rather, their buoyant step and slight smiles let me know that they were up to something, and proud of it. They are proud of their role in training Navy surgeons who go out all over the world.

Naval Hospital Camp Pendleton supplies surgeons to fleet surgical teams that deploy aboard amphibious ships and aircraft carriers where trauma is an everyday risk. Most of our surgeons come from those plat-

gram was LCDR Gary Schwendig, MC. LCDR Schwendig served 13 months as ship surgeon aboard the *USS Independence* (CV-62) in Yokosuka, Japan, where he didn't see much trauma. "What the Navy does is take you right out of residency and send you out on a ship. You can lose tremendous skill on a ship. I can honestly say that I have not done major trauma since 1995. This program is giving me the chance to rejuvenate my trauma skills."

CDR Weiss, founder of NHCP's program, points out that, "An integral part of general surgery is the care of traumatically injured patients. This is especially true in the military where surgeons regularly provide medical support for high-risk or potential combat scenarios. Effective care in these situations requires up-to-date and ongoing trauma experience. A class affiliation with Mercy Hospital allows us to dedicate more time in a fast-paced, truly life-threatening environment. Staff members at Mercy Hospital's level I trauma center have extensive experience in the management of the critically injured, as the center sees approximately 1,500 major trauma patients per year."

Because of the locality, the program is heavily laden with military

patients as well. As LCDR Kuncir and CDR Weiss came on watch one night, five active duty Marines, who had been involved in a brawl across the border, were brought in from Tijuana. Some had life-threatening stab wounds to the neck. The program inadvertently provided excellent continuity of care for the men.

While the rule in trauma is that the patient will be brought to the designated trauma center, finalized care can be performed at the regional military hospital. Drs. Weiss and Kuncir saw and treated the Marines in the emergency room, performed the trauma surgery with Dr. Sise presiding, and followed up with the Marines at NHCP once they were stable enough to transfer.

Mercy Hospital has a long tradition of staff who are proud to have served this country. Their pride has an inno-

forms and deploy to those places all the time. This program is a mechanism with which we can maintain that level of expertise throughout a surgeon's shore-based rotation.

Navy surgeons are ready to forsake all frill and sophistication to deploy anytime, anywhere in the world even though the contingency environment may not have all the resources one would find in a level I trauma center. Nevertheless, Naval Hospital Camp Pendleton is proud to offer this opportunity to its surgeons so that they will be better prepared to apply their skills wherever the mission may take them. □

—Story and photos by LT H. Veronica Southby, NC, USNR, Public Affairs Office, COMNAVAIRPAC, San Diego, CA.

“Freedom Has No Finer Friend”

Zachary Fisher Receives Presidential Medal of Freedom

“I can think of no one more deserving to receive the Medal of Freedom than Zachary Fisher because freedom has no finer friend.” With this introduction, President Bill Clinton presented the Medal of Freedom, the nation’s highest nonmilitary decoration, to philanthropist and patriot Zachary Fisher in a 14 Sept 1998 ceremony in New York City.

Before an audience which included the President and Mrs. Clinton, Secretary of Defense William S. Cohen, New York City Mayor Rudolph Giuliani, former Joint Chiefs of Staff Chairman General John Shalikashvili, and the heads of all five military branches, Fisher was cited for his steadfast and generous support of the U.S. military.

President Clinton recounted Fisher’s love for the military: “In the history of our country, no single individual has given more philanthropically to the men and women who defend our freedom than Zachary Fisher.”

As always, his wife Elizabeth was present to share the honor, which Fisher described as “humbling.” He responded to President Clinton: “We [the Fisher family] share in today’s recognition of our support of those who give their lives to protect and



Zachary Fisher with the President and First Lady

defend our freedom. We owe them no less.”

Fisher was cited for extraordinary devotion to all men and women in uniform through a wide array of philanthropic activities. Included were his preservation of the World War II aircraft carrier USS *Intrepid*, the establishment of the network of 25 Fisher Houses, his scholarship program, his financial support of the families of

military personnel lost in the line of duty, and the Children’s Center at Camp Pendleton, CA.

Fisher’s award and citation will be permanently displayed at the Intrepid Sea Air Space Museum in New York City. □

—Story and photos by the Fisher House Foundation, Inc.

Naval Force Health Protection: Doctrine for the 21st Century

LT Maurice Morales, MSC, USNR
CDR Richard Cocrane, MSC, USN
CAPT Edward P. Wyatt, MSC, USN

Second in a Series

The rapid pace of change in Navy medicine continues unabated. But while most observers are familiar with major initiatives such as the TRICARE and the Anthrax Vaccination Implementation Plan, few are aware of developments in operational health service support—the care that is provided—to Sailors and Marines “at the tip of the spear.” In our last article we defined the role that doctrine plays in this realm, and outlined the process by which the components of Navy medicine collaborate to develop the authoritative guidance for how we deliver health care in the operational environment.⁽¹⁾ In this article we examine the evolving concepts and principles driving the publication of the Navy’s new overarching health care doctrine publication, *Naval Force Health Protection*.

Before we proceed, we would like to report on the progress made so far in the development of the Navy’s new health service support doctrine publications. Table 1 lists the Naval Warfare Publication number, title, and primary review authority for each of the new publications. (Recall that the Primary Review Authority (PRA) is responsible for developing, coordinating, reviewing, and maintaining an assigned publication.)

As of this writing (early fall), all these publications have progressed beyond an approved outline to the first draft stage. This stage is the most critical in the process, as authors wrestle with choices about what doctrinal principles to codify in writing and how forward-looking their publications should be.

Since the highly interactive development process can take as long as 15 to 18 months, doctrine writers must balance current practice with emerg-

ing concepts. The goal is to produce doctrine that is practical but not dated. Based on outlines and working drafts produced so far, the primary review authorities have achieved this balance successfully.

PRAs have also successfully integrated input from active component, reserve component, fleet, Marine Force, staff, and operational participants. The process has been a model of collaboration among all doctrine stakeholders. All publications are on track to be published by the end of FY99.

Concept and Principles of Force Health Protection

The Navy’s current overarching health care publication, *Operational Health Service Support*, was published in August 1995. It addresses the subject matter in general terms from echelons of care and command relationships to types of operations, medi-

Table 1. NWP 4-02 Series Publications

NWP	Title	Primary Review Authority
4-02	Naval Force Health Protection	OPNAV (N931)
4-02.1	Health Service Support Logistics	NAVMEDLOGCOM
4-02.2	Patient Movement	BUMED (MED-03)
4-02.3	Health Service Support for Military Operations Other Than War	OPNAV (N931)
4-02.4	Fleet Hospitals	NAVSUPSYSCOM (PML-500)
4-02.5	USMC Health Service Support Operations	Publication Complete(2)
4-02.6	Hospital Ship Health Service Support Operations	MSC (PM1H)
4-02.7	Combat Stress Control	OPNAV (N931)

cal intelligence, and blood support. Most of these subtopics are still relevant, but specific doctrinal concepts and principles need to be updated to conform to the new and evolving warfighting strategies and tactics they

are designed to support. The revised publication, *Naval Force Health Protection*, delineates how Navy medicine will operate under scenarios envisioned in *Forward From the Sea*, *Operational Maneuver From The*

Sea (OMFTS), and *Joint Vision 2010 (JV 2010)*.

The concept of Force Health Protection (FHP)(3) originated in the Medical Readiness Division (J-4/MRD) of the Joint Chiefs of Staff. In



Figure 1. Concept of Force Health Protection

Table 2. Echelons of Care Vs. Levels of Care

Echelon	Type of Care	Level	Capability
I	First Aid Emergency Care	I	First Responder
II	Initial Resuscitative Care	II	Forward Resuscitative Surgery
III	Resuscitative Care	III	Theater Hospitalization
IV	Definitive Care	IV	Theater Hospitalization
V	Convalescent Restorative Rehabilitative Care	V	Definitive Care

simplest terms, FHP is a unified strategy designed to protect servicemembers from all health and environmental hazards associated with military service. As Figure 1 illustrates, FHP is an integral part of the National Military Strategy.⁽⁴⁾ It is supported by the three “pillars” of a Healthy and Fit Force, Casualty Prevention, and Casualty Care and Management. These pillars, in turn, rest upon direct support from the services and the foundation of the military health system.

A Healthy and Fit Force is a necessary precondition for all other elements of FHP. Physical fitness training, health promotion programs, family support services, occupational health programs, periodic health assessments, stress management, and TRICARE are the building blocks for a Healthy and Fit Force. Each of these components must be in place and operating smoothly during peacetime and contingencies, and each must be fully engaged with servicemembers.

The purpose of the second pillar of FHP, Casualty Prevention, is to counter two types of threats to health: disease and non-battle injuries and the threat posed by the enemy. Disease and non-battle injuries (DNBI) may result from environmental hazards such as

air or water pollution, as well as infections such as malaria, dengue fever, and hepatitis. To prevent casualties from DNBI, FHP postulates a comprehensive medical intelligence system bolstered by continuous monitoring and surveillance and individual health screenings.⁽⁵⁾ In contrast to previous practice, these screenings now routinely take place before and after deployments, and they are documented more stringently. In addition to limiting exposure to potential hazards, Casualty Prevention also includes an aggressive immunization policy. The Anthrax Vaccination Implementation Plan is the most visible and well-publicized example of this new approach.⁽⁶⁾

Combat-related wounds obviously may result from hostile enemy actions. In keeping with the warfighting principles of *Joint Vision 2010*, Casualty Prevention advocates such measures as personal protective equipment, the dispersal of forces and the application of “systems of military systems” to reduce enemy capabilities before they can inflict casualties.

The third and final pillar of Force Health Protection, Casualty Care and Management, closely resembles tra-

ditional health service support (HSS). Current HSS doctrine was developed when the principal threat to the United States and its allies was global war against the Soviet Union and its allies. Even during Operations Desert Shield/Storm, referred to as a major regional conflict, the coalition led by the United States employed overwhelming combat forces (numbering in excess of 700,000 men and women) supported by an unparalleled logistics system. The Navy alone deployed three 500-bed fleet hospitals (each requiring a site 28 acres in area), as well as both 1,000-bed hospital ships (USNS *Mercy* and USNS *Comfort*).

Under this type of combat scenario, all the services applied the principles embodied in the five echelons of care, which are defined in Table 2. In general terms, this involved providing care in as responsive, simple, and economical a manner as possible, consistent with the tactical situation. Thus, a casualty would receive emergency first aid (Echelon I) at the site of injury, and then be evacuated rearward to a facility that could provide initial resuscitative care, such as a casualty receiving and treatment ship (CRTS) (Echelon II). The patient would continue to be evacuated to higher ech-



**Traditional
Concepts**

**Are Transformed
by Key Enablers**

**Into New
Operational
Concepts**

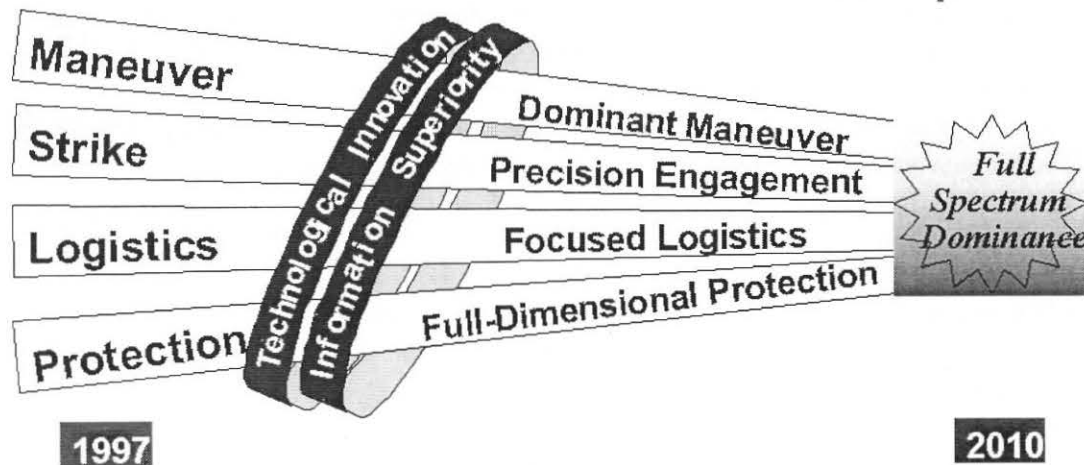


Figure 2. Operational Concepts of Joint Vision 2010

elons until reaching that echelon that could expedite return to duty. A patient who was not expected to return to duty within the defined theater evacuation policy(7) would ultimately be moved to a CONUS facility (Echelon V). This doctrine—and the large, heavy, and highly sophisticated deployable medical platforms that resulted from it—was entirely consistent with massive amphibious and conventional combat operations that until recently were the mainstay of U.S. military strategy and tactics. It served our armed forces well for many decades.

As the threat of global war recedes, U.S. military planners are developing new warfighting concepts to counter the more likely scenarios of smaller scale contingencies. As Figure 2 illustrates, these concepts are predicated on smaller, lighter, more mobile, flexible, and lethal forces.

Technological innovation and information superiority are crucial to the success of this new approach. Consequently, Force Health Protection, which is a component of Focused Logistics, embodies Casualty Care and Management based on analogous principles.

Casualty Care and Management under FHP consists of the five levels of care listed in Table 2. While these levels resemble the former echelons there are important differences. Level I, or First Responder, still envisions immediate lifesaving measures such as maintenance of airway, control of bleeding, and prevention of shock. But in the anticipated operational environment of the 21st century, which will utilize a much smaller logistics "footprint," the "buddy" or corpsman that renders this emergency care will have to be more highly skilled. First Responders may also need to

restore an airway using a surgical procedure, administer antibiotics or intravenous fluids such as Ringer's lactate and human albumin, or apply other advanced treatments such as the fibrin bandage (when it is perfected).

Level II, or Forward Resuscitative Surgery, is also similar in concept to current doctrine. Its purpose is to prevent death, loss of limbs and bodily functions. A team of physicians or physician assistants, complemented by appropriate Hospital Corps and nursing staff, provide this essential level of care.

The platforms that provide Forward Resuscitative Surgery may include basic laboratory, medical imaging, and pharmacy in addition to surgical capabilities as they do now, but to support scenarios envisioned by OMFTS, for example, they must be smaller, lighter, and more mobile and

flexible. The services are currently experimenting with different configurations for these new platforms.

Under Force Health Protection, levels III and IV both encompass Theater Hospitalization. Level III is the first step toward restoring functional health, as opposed to procedures that merely stabilize a condition or prolong life. This level is staffed to provide enhanced resuscitation, advanced surgery, and postoperative treatment. Level IV care provides definitive therapy for patients in the recovery phase. If rehabilitation cannot be accomplished within a predetermined holding period, the patient is evacuated to level V.

Under current doctrine, Navy fleet hospitals and T-AH 19 *Mercy* class hospital ships (both at Echelon III) and OCONUS medical treatment facilities (MTFs) (at Echelon IV) provide care on a par with that envisioned by the new levels III and IV. But for most of the scenarios contemplated by *OMFTS* and *JV 2010*, these platforms are not small, light, or flexible enough. Thus, Navy medicine has reengineered and begun to deploy a variant of the fleet hospital called a Naval Expeditionary Medical Support System (NEMSS). This platform consists of a modular version of a theater hospital with two operating tables and a ward configuration ranging from 0 to 20 intensive care beds and 0 to 90 acute care beds. Even in its full configuration, the NEMSS requires about 80 percent less "real estate" for setup. Nevertheless, it retains extensive capabilities for surgical and specialty care.

Level V of Casualty Care and Management, Definitive Care, is comparable to Echelon V, where convalescent, restorative, and rehabilitative

care is normally provided by military, Department of Veterans Affairs, or civilian hospitals in CONUS. This level may include a period of minimal care and increasing physical activity necessary to restore patients to functional health. FHP's success depends as much on a well-developed network of CONUS providers linked with sophisticated communication and information systems as it does on deployable medical platforms. Thus, Navy medicine's peacetime benefit mission, manifested in the TRICARE managed care program, is an essential foundation for medical readiness.

In addition to the five levels of care, Casualty Care and Management also encompasses a robust capability for providing en-route care. This is critically important under scenarios that envision a minimal medical "footprint" and an emphasis on moving casualties rearward as expeditiously as possible. The goals for en-route care include ensuring that patients receive essential care prior to evacuation, utilizing the most appropriate modes of transportation, and preserving forward deployed medical personnel. It requires the use of state-of-the-art, lightweight, interoperable medical equipment to prevent the deterioration of the patient's condition. En-route care also requires highly trained medical personnel.

Conclusion

In summary, *Naval Force Health Protection* represents an evolution of doctrine from episodic, illness-focused, procedure-oriented health service support to surveillance and preservation of health from accession, through the deployment life cycle, and even into separation or retirement. Whether in the field in a

foreign country or in garrison in CONUS, both potential hazards and the health status of servicemembers will be continuously monitored and managed to ensure the control of the former and the optimization of the latter. From the doctrinal perspective, application of the principles of FHP will help ensure Navy medicine is prepared for the operational challenges of the 21st century.

References

1. Morales M, Wyatt EP. The development and refinement of naval health services doctrine. *Navy Medicine*. November-December 1998;89(6):13-17.
2. Marine Corps Warfare Publication 4-11.1.
3. As of this writing, the concepts and principles of FHP, including levels of care, are being officially reviewed through the coordination of Joint Publication 4-02 *Doctrine for Health Service Support in Joint Operations*. Thus, these concepts and principles have not been approved as doctrine yet.
4. *Shape, Respond, Prepare Now: A Military Strategy for a New Era*. National Military Strategy of the United States of America 1997.
5. See DOD Directive 6490.2 Joint Medical Surveillance and DOD Instruction 6490.3 Implementation and Application of Joint Medical Surveillance for Deployments.
6. See SECNAV Instruction 6230.4.
7. According to Joint Publication 4-02.2 *Joint Tactics, Techniques and Procedures for Patient Movement in Joint Operations*, the theater evacuation policy states the number of days a patient may be held in theater for treatment. Patients who cannot return to duty within the specified number of days are evacuated. □

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Parent command at NAS Norfolk, VA

MSC Officers Lead the Way in Navy Occupational Safety, Health, and Environmental Protection Training

In the past 3 years, the Navy Occupational Safety and Health, and Environmental Training Center (NAVOSHENVTRACEN) has emerged as the military's premier and only training center delivering integrated environment, safety, and health training. Who they train, what they train, where they train, and how they train are distinctive and

unlike any other Navy schoolhouse. This is also the only non-BUMED activity commanded by a Medical Service Corps officer. Navy Medicine recently interviewed CDR Paul Gillooly, the former commanding officer. He is now director of environmental programs at the Naval Environmental Health Center, Norfolk, VA.

Why are MSCs designated to run this non-BUMED activity?

Both the CO and XO positions as well as the two military officer instructor billets here are subspecialty coded 1861 for industrial hygiene officers. The reason for the billet specificity is that it is critical that both the management and the instructors have environment, safety, and health for-

mal training and experience, both ashore and afloat, to provide the level of expertise required to run such a complex organization. Industrial hygiene officers run these programs at the Fleet, Type Commander, Regional Support Organization (RSO), and the Shore Intermediate Maintenance Activity (SIMA) level, and function as safety officers on tenders and as the assistant safety officers aboard CV/CVNs. The CO position is nominative and is screened both by CNET, because we are one of their echelon three commands, and by CNO (N45), the policymaker for Occupational Safety and Health and Environmental Protection.

What drives your schoolhouse or, put another way, why does the school exist?

The delivery of our training and services is *requirements based* and driven by Federal OSHA (29 CFR 1910) and EPA (40 CFR 260, 302, 61) as well as state and local regulations. Our primary Navy drivers are:

- OPNAVINST 5100.23D (*Navy Occupational Safety and Health Program Manual*)
- OPNAVINST 5100.19C (*Navy Occupational Safety and Health Program Manual for Forces Afloat*)
- OPNAVINST 5090.1B (*Navy Environmental and the Natural Resources Protection Manual*)

Our training architecture is also unique. We participate and operate under two CNO training steering committees:

Students and instructor discuss personal protective equipment requirements during a field exercise in the "Hazardous Substance Incident Response Management" course.

The NAVOSH and HMC&M Training Steering Committee with its four Working Groups—Air, Surface, Submarine, and Shore—and the Environmental and Natural Resources Program Training Steering Committee with its two Working Groups—Ashore and Afloat.

These two committees are highly motivated and have aggressively developed two training plans. They are:

- NAVOSH and HMC&M Naval Training Plan
- Environmental and Natural Resources Program Naval Training Systems Plan

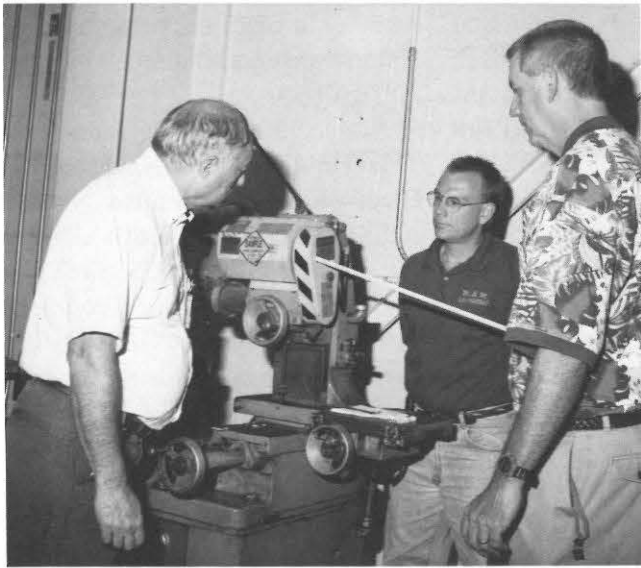
These are our blueprints and, when combined with CNO's NAVOSH Strategic Plan for Training and Education, they form our business plan and the basis for both short- and long-term execution.

What are some recent events which have influenced the change in focus for NAVOSHENVTRACEN?

Today's TRACEN is a direct descendant of the original NAVSEA Safety School in Bloomington, IN, founded in 1967. They functioned as the Navy's source of weapons and explosives safety training for the Naval Weapons Support Center, Crane, IN, hence the reason for the location. Shortly thereafter, their mission expanded to include shore occupational safety and health training.

It was CNO's vision to relocate the school to the fleet and further expand the mission to include afloat occupational health, hazardous materials, and environmental protection training. So in 1991 the TRACEN was moved to NAS Norfolk. We have since expanded with a TRACEN Detachment on NAS North Island. That brings us up to today where we





During a field trip for the "Machinery and Machine Guarding Standards" course, the instructor points out hazards on the shop floor.



Instructor demonstrates proper method of donning personal protective equipment for the "Asbestos Supervision" course. Course completion confers EPA certification.

offer the most comprehensive training in environment, safety, and health in the federal government.

What would be the scope of your training effort over the course of a typical year?

We put roughly 7,500 students through per year. This breaks down into 275 separate course convenings or about one convening every working day somewhere in the world. The types of students range from full-time professionals and collateral duty personnel, both active and civilian to Marine Corps, Military Sealift Command, and occasionally Army, Air Force, and foreign military.

We deliver 45 courses of which three are NEC producing. We have a healthy 60/40 split of contract versus in-house instructor delivery. Our instructor mix ranges from military (officer and enlisted) and civilian staff instructors, to contractors and academic and government institutions.

Your method of training delivery differs significantly from the norm. Can you explain what that is and how it evolved?

Originally, only the parent command facility existed in Norfolk so we were single-sited. Our vision was to deliver the training to the customer free of charge to minimize impact on ship or activity's OPTARs. So we aggressively sought out a West Coast training facility to call our own and extend our reach throughout WESTPAC. Fortunately for us, the CO of NAS North Island donated a building for that purpose. We spent a few bucks to renovate it and the rest is history. Fifty percent of our training now occurs either in our command facilities in Norfolk or San Diego, the Navy's two largest fleet concentration areas. We are able to service 40 percent of the surface forces, 60 percent of the CV/CVNs, 50 percent of the active duty, and 30 percent of the civil service population without us or them ever leaving home. The remain-

ing 50 percent of our training is delivered to other fleet concentration areas using a mobile training team concept. We typically train in 30 locations worldwide each year. This unique and customer-oriented approach saves the fleet approximately 3 million a year in cost-avoidance which just about offsets our annual budget.

TRACEN has a rather unique training vehicle which the BUMED claimancy is a big customer.

Yes, this is called our NAVOSH Registration Fee Advance Program which is designed to provide optimum variety and availability of professional development courses for NAVOSH professionals. This program also supports the formal training subject-matter listed in the *Career Development Program for Safety and Occupational Health Personnel* (NAV-EDTRA 10076A). We essentially pay the tuition for attendance at courses using pre-approved vendors and the

activity only picks up the travel and per diem, if any. We created this training option because we realized there are professional specialties, like industrial hygienists and occupational medicine physicians and nurses, that due to their small numbers Navywide would not warrant stand up of a TRACEN course. Examples of training subjects include safety and health in the health care setting, indoor air quality, and toxicology. Typical vendors might include the CDC's National Institute for Occupational Safety and Health (NIOSH) or the National Safety Council. This has become a very successful program with BUMED as our largest customer.

You've talked about training delivery. How has technology affected your delivery?

About 3 years ago we decided to go after this one (training technology) in a big way and made it one of our critical processes. Our approach was three-pronged—hardware, software, and staff training. We went full multimedia in the classrooms and tossed out the TV/VCR combo and the over-

head and slide projectors. We LANed each classroom (three East Coast, two West Coast) and now use high-resolution video projectors and full motion videos on 6- by 8-foot electronic screens. We also installed theater-style surround sound audio systems, ergonomic chairs, and provide free popcorn (just kidding).

All courses of instruction are delivered using Powerpoint, wav files, and full-motion video. This has also allowed us to introduce cutting edge Environment Safety & Health Internet training. Many of our classes involve labs and hands-on training using mock-ups such as *hazardous material spill response* or *asbestos rip-out training*. We have introduced video and digital camera technology which gives the student immediate feedback.

To support our staff in this effort, we have put together several high-end computer graphics workstations with digital cameras, scanners, CD burners and jukeboxes, postermakers, laminators, and desk-top publishing software for instructors to upgrade and maintain lesson plans. Of course it goes without saying we put each staff

member through a rigorous hardware and software continuum of training to pull it all off.

We have also gone after Video Tele-Training (VTT) using the CNET Electronic Schoolhouse Network (CESN). Using CESN, of which there are 30 sites in CONUS, in 2 short years we have gone from 1 course and a student throughput of 100 to 4 different courses and a student throughput of over 1,500 using VTT. We recently piloted a VTT effort between NAVOSHENVTRACEN in Norfolk and USS *George Washington* (CVN-73) while under way in the Gulf. The 40-hour Safety Programs Afloat course was transmitted via satellite uplink to 17 division safety petty officers aboard the ship for 5 days simultaneously with classes in Norfolk and Mayport. Despite the time zone difference and some minor technical problems we were able to complete the training and certify everyone. This technology will improve as will the frequency with which we use it to train our forward deployed forces.

Another technological area we have gotten into is computer-based training (CBT). We have several computer labs used to teach specific software, for example, to track and manage hazardous materials. We have also worked with CNET's computer-based training effort called the Shipboard Enhancement Training Program or STEP by putting several of our courses on CBT. This initiative will take formal courses of instruction and develop and deploy these in CBT for use aboard ships. The obvious advantage for the ships is cost-avoidance



Students simulate asbestos removal using a glove-bag technique for the "Shipboard Asbestos Response" course.



Instructor demonstrates respirator fit-testing on a student for the "Respiratory Protection Officer" course.

for travel and per diem, and recouping that lost productivity which occurs with time away from the ship. This technology is promising and has potential along with Internet or web-based training and will definitely be a growth area for Navy training.

Lastly, we stood up a command homepage (WWW.NORVA.NAVY.MIL/NAVOSH/) increasing customer download access to our course catalog, our technical publications, and our staff. This fiscal year we added a new feature of course registration by E-mail which has grown to 50 percent of our quota requests in a scant 6 months. For those ships without Internet access we have our course catalog posted on the Streamlined Automated Logistics Transmission System (SALTS) which is like an electronic post office box open 24 hours a day for download.

Your mission statement mentions "training-related services." What does that entail?

One specific area is technical reviews of various pubs and curricula. We are the sole Navy focal point for technical reviews of:

- Navy Rate Training Manuals
- Personnel Qualification Standards (PQSSs)
- Naval Training Requirements Reviews (NTRRs)
- NAVOSH videos in the Navy Electronic Media Centers
- Navy Occupational Task Analysis Program (NOTAP) Task Inventory Books

We review the subject medium for environment, safety, and health technical content to ensure it is present and technically accurate.

We also develop and publish a variety of manuals as course handouts to help field personnel run their programs. Tools for their toolboxes if you will. Our publications include:

- *DOD Catalog of Occupational Safety and Health Training Courses* (NAVEDTRA 10075-D)
- *NAVOSH Training Guide for Shore* (NAVEDTRA 10092)
- *NAVOSH Training Guide for Forces Afloat* (NAVEDTRA 10074-A)
- *Environmental Protection Training Guide* (NAVEDTRA 10091)
- *Regional Environmental Coordinator (REC) Guide*
- *Hazardous Material Incompatibility Chart* (Rev 1 Jan 96)
- *Hazardous Material Program Management Guide*
- *Afloat Environmental Protection Coordinator Program Management Guide*
- *Hazardous Material Program Course Reference Guide*
- *Afloat Environmental Protection Coordinator Reference Guide*
- *Shipboard Emergency Response Course Reference Guide*
- *IMA Asbestos Removal Reference Guide*

CNO has also tasked us to be the conference administrator of the Annual NAVOSH Professional Development Conference. The intended audience is full-time and collateral duty NAVOSH personnel, ashore and afloat. This is held alternately in Norfolk and San Diego to allow equal access to both fleets. Attendance is around 500 personnel with the conference consisting of:

Course Titles (CINs)

Afloat Environmental Protection Coordinator (A-4J-0021)	Hazardous Substance Incident Response Management (HSIRM) (A-493-0077)
Afloat Hazardous Material Coordinator (A-8B-0008)	Hazardous Substance Incident Response Management (HSIRM) Refresher (A-493-0083)
Asbestos Inspector (TBD)(New)	Introduction to Hazardous Materials (Ashore) (A-493-0031)
Asbestos Refresher (TBD)(New)	Introduction to Industrial Hygiene for Safety Professionals (A-493-0035)
Asbestos Management Planner (TBD)(New)	Introduction to Navy Occupational Safety and Health (Ashore) (A-493-0050)
Asbestos Management Planner Refresher (TBD)(New)	Laser System Safety Officer (Category I) (A-493-0038)
Asbestos Project Designer (TBD)(New)	Laser System Safety Officer (Category II) (A-493-0067)
Asbestos Project Designer Refresher (TBD)(New)	Machinery and Machine Guarding Standards (A-493-0073)
Asbestos Project Monitor (TBD)(New)	Mishap Investigation and Prevention (Ashore) (A-493-0078)
Asbestos Project Monitor Refresher (TBD)(New)	Mishap Recordkeeping Seminar (A-493-0079)
Asbestos Worker/Supervisor (A-493-0069)	Navy Ergonomics Program (A-493-0085)
Asbestos Worker/Supervisor Refresher (A-493-0069)	Navy On-Scene Coordinator/Facility Incident Commander (TBD)
Aviation Safety Specialist (A-493-0065)	Occupational Safety and Health (OSH) Two Thousand (2000) (A-4J-0019)(New)
Confined Space Safety (A-493-0030)	Occupational Safety and Health (OSH) Management 2000 (TBD)
Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP)/Hazardous Inventory Control System (HICS) (TBD)	Respiratory Protection Program Management (A-493-0072)
Construction Safety Standards (A-493-0021)	Respiratory Protection Officer (A-4J-0082)
Cranes and Material Handling for General Industry (A-493-0074)	Safety Appraisal (A-493-0043)
Electrical Standards (A-493-0033)	Safety Programs Afloat (A-493-2099)
Facility Response Team (FRT) (40 hour) (A-493-0012)	Safety Training Methods (A-493-0063)
Facility Response Team (FRT) (24 hour) (A-493-0012)	Shipboard Asbestos Emergency Response (A-760-2166)
Fall Protection Systems (A-493-0084) (New)	Submarine Safety Officer (F-4J-0020)
Fire Protection and Life Safety (A-493-0075)	
General Industry Safety Standards (A-493-0061)	
Ground Safety for Marines (A-493-0047)	
Hazardous Material Control and Management (HMC&M) Technician (A-322-2600)	

- 1 day General Session
- 1 day Breakout Sessions for Shore and Afloat
- 1 day Major Claimant Breakouts
- 2 days of Professional Development Training on variety of NAVOSH topics

We have also stood up an Intern Program with Old Dominion University and Southern Indiana University with four to six undergraduate and graduate students working at the command which is a way for us to get free labor and them to get some real world

experience and add to their resume before they graduate.

What metrics do you use as indicators of your training effectiveness?

On the objective side we test each student before a certificate of completion is granted. We remediate when necessary. We also rely on periodic internal and external course audits by subject matter experts. We use student critiques which are not only a valuable tool for effectiveness but gives us the student's perspective of

their total training experience. Our ultimate goal is we want to arm the student with the knowledge, information, and tools necessary to change behavior when they return to the worksite.

Measuring behavioral change is tricky. We rely to a large extent on inspection results from the Navy IG on the shore side and the Presidents Board of Inspection and Survey (PRESINSURV) on the afloat side. Both these teams are stewards of environment, safety, and health.—JKH

Supporting Our Children:

A Review of Popular Positioning Devices

Temrah M. Okonski

This article reviews the possible effect that some positioning devices have on the development of normal children. In today's age in which families are plagued with time constraints, convenient devices such as stationary standing frames, various baby walkers, and carrying seats seem to take the place of parental supervision. Military medical health care professionals can offer guidance about such devices thereby helping parents raise healthier children.

Children learn to understand the world around them by moving. Experience and practice facilitate the achievement of developmental milestones. When normally developing children explore movement their muscles strengthen while the connections between different neurons are reinforced. Research shows that, "If neurons are used, they become integrated into the circuitry of the brain by connecting to other neurons; if they are not used they may die. It is the experiences of childhood, determining which neurons are used, that wire the circuits of the brain . . ." (1) Therefore, children are more apt to crawl, for instance, as the movement becomes easier for their muscles and their higher level coordination centers.

Equally important to muscle and brain development is the maturation of the skeletal system. Tension and loading applied over time influences immature bone. (2) For example, when children lay on their stomachs their iliopsoas muscle lengthens. This reduces neonatal hip flexion contractures which in turn encourages active hip extension and external rotation. "Muscles that extend and laterally rotate the hip . . . apply lateral torque forces across the proximal femur" reducing the amount of femoral antitortion or medial twisting of the femoral shaft. (2) This bony configuration influences the development

of a mature gait as unresolved rotation produces knee and foot alignment problems in standing.

Medical professionals can help parents understand that motor development is a gateway to higher level learning. Movement plays an important part in the thinking processes. For example, crawling encourages the development of the corpus callosum, hence the development between the right and left sides of the brain. Being active helps strengthen eye muscles, and "Efficient eye teaming enables a student to focus, track, and concentrate when reading." (3) When children begin to climb and jump, they learn about gravity and spatial relationships. Hopping and skipping, on the other hand, help to develop a child's sense of balance and coordination between their right and left sides. These skills may help with writing abilities which also require a sense of secure balance and the coordination of the writing and steadying hand. (3)

Consider the effect of prolonged positioning. A number of positioning devices have inundated the pediatric market making floor play limited because of over utilization. Walkers and Exersaucers may not only discourage the achievement of motor milestones such as crawling but may also encourage toe walking in some children. It may be wise to help parents understand the following points. Use of such a device for 1 to 2 hours a day is acceptable. Discontinuing use if toe walking develops is advised. To help place the feet and hips in a more appropriate biomechanical alignment, adjusting stationary devices into the sitting, rather than standing, position is recommended.

Devices that hang from doorways and allow children to jump by themselves should also be used cautiously and sparingly. Premature and imposed forceful

bouncing may fracture young bones when such devices are used by children who are unable to stand and bounce on their own. In addition, weight bearing before structures can tolerate loading can produce abnormal forces on developing knees thereby changing postural alignment. (4)

Finally, consider the effect of prolonged positioning in a seat that maintains an infant at a 45° angle. Head movement as well as eye muscle development may be inhibited. (3) When a parent carries a child, on the other hand, the child develops eye, neck, and torso muscle strength.

In conclusion, medical professionals should encourage parents to provide children with a stimulating motor environment. One might begin by recommending that parents carry children the old fashioned way and may try to de-emphasize the use of fancy positioning equipment. Reverting back to using more simple equipment, such as playpens, may enhance a child's motor development. The recommendations medical practitioners impart today can have a positive impact on the development of our children.

References

1. Begley S. Your child's brain. *Newsweek*. February 19, 1996:55-62.
2. Cusick BD. *Progressive Casting and Splinting for Lower Extremity Deformities in Children with Neuromotor Dysfunction*. Arizona: Therapy Skill Builders; 1990.
3. Hannaford. *Smart Moves*. Virginia: Great Ocean Publishers; 1995.
4. Leveau DB, Bernhardt DB. Developmental biomechanics: the effects of forces on the growth, development, and maintenance of the human body. *Phys Ther*. 1984;64(12):1874-1881. □

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Multicultural Care in Navy Medicine

Lessons Learned From an Egyptian Chief Petty Officer

LT Youssef H. Aboul-Enein, MSC, USNR

Members of the military medical services increasingly are tasked to provide care to patients from other nations. This care may be provided in expeditionary operations like a Noncombatant Evacuation Operation (NEO) or may simply be care provided to a foreign military member studying in CONUS. Corpsmen, nurses, Medical Service Corps officers, and doctors of today need to be sensitive to the cultures they are dealing with in striving to provide care to a patient. As an American of Egyptian origin, I have had the opportunity to act as interpreter and mediator for several Arab patients at Naval Hospital Jacksonville, FL, while a junior officer. I shall focus on items of interest from the Egyptian culture, some of which transcends Arab culture in general.

Health Picture of Egypt

There are many health risks endemic to the banks of the Nile. Many rural Egyptians suffer from parasitic diseases; one of the more common is schistosomiasis, referred to on the African continent as bilharzia. In 1995 doctors at Naval

Hospital Jacksonville dealt with a case of *Schistosoma Haematobium* in the advanced stages. The patient, an Egyptian navy chief was brought to us by a group of Egyptian sailors training in NSY Mayport, FL. After talking to the patient in his native language, I reported to the attending physician that he was born in Sudan and grew up along the banks of the Nile, immigrating to Egypt as a child and joining the navy. The description of his pain and analysis of his urine and stools showed parasitic worms indicative of the disease.

The life cycle of schistosomiasis includes snails and humans as hosts. Microscopic cercariae are ejected from the snail in midday and enter the skin of those who typically swim, wash, and tend crops along the Nile. The parasitic worms mature and reproduce inside the human host. Female worms expel the eggs into the blood stream, liver, and urinary tract. When this occurs the body treats these as foreign objects and surrounds the eggs with granular tissue. The end result of this cycle to the host is cirrhosis, bladder cancer, as well as renal and liver failure.

Blindness caused primarily by trachoma is also endemic to the Nile valley. Typhoid diseases, which are endemic in urban centers, streptococcal diseases, and tuberculosis are also issues many Egyptian doctors contend with. Dehydration is also a problem because Egyptians are not culturally sensitive to the need for consuming water.

Cultural Issues Which Affect Health

The Egyptian diet tends to be high in fat, sodium, and sugar. Food is a major form of entertainment and contributes to obesity. Common ailments in Egypt include heartburn, constipation, hemorrhoids, and fecal impaction. This is a result of limited vegetable and fiber consumption, lack of fluids, and rapid consumption of food, which is a cultural issue. There are some archaic beliefs about food among a few Egyptians which include not drinking fluids with meals. They believe fluids take space in the stomach which could be used for solid nutrients. Another archaic belief that is seen not only in Egypt but also in the southern Mediterranean is associating increased food consumption with good health. Hence, the tendency for child obesity is the belief that more food equals more health.

When dealing with an Egyptian patient you will find a focus on treating ailments medicinally and an unwillingness to consider a change of diet and lifestyle. This stems primarily from a fatalistic view of the world, thinking that their destinies are pre-ordained by God. Nowhere is this more prevalent among Egyptians than in the treatment of hypertension. Religious issues focusing on food consumption include the Islamic ban on pork and pork products and also the avoidance of all alcoholic beverages. However, there are Egyptian Coptic Christians who consume both pork and alcohol.

Convincing a Muslim patient to break the fast during Ramadan may pose a challenge to the doctor and nurse attending. It is important to realize that Ramadan is from sunup to sunset and a Muslim must not touch food or water during this time. Islamic Law, however, does allow for exemptions in case of health problems and pregnancy. It may be fruitful if you locate another Muslim to remind the

patient of these exemptions. Commands today are sensitive to the diversity of Sailors and Marines, and a Muslim lay-leader typically can be found in many military treatment facilities. The chaplain can assist in locating the nearest Muslim community.

While at Naval Hospital Jacksonville I tended to the Egyptian chief's spiritual needs, providing him with a prayer rug, Quran (Muslim Holy Book), and the proper directional orientation toward Mecca. The chaplain's office at the hospital aided me. A Muslim may have certain limitations on consuming meat not blessed by God, depending on his/her devoutness. Islamic Law allows for a devout Muslim to eat meat prepared according to Jewish Kosher tradition and Mosaic Law. Egyptian Muslims who are terminally ill derive comfort from the Quran and the Prophet Muhammad's sayings.

In the case of the Egyptian chief petty officer, who was an inpatient for about 2-3 weeks, I reminded him that losing hope means that he is losing faith in God and the abilities of the divine to heal. This became more important since he had never been officially diagnosed with terminal schistosomiasis.

Aside from the mental benefits of prayer, Muslims believe that washing five times a day before prayer aids in hygiene and cleanliness. The prayer act itself, made up of systematic bending and kneeling, increases a person's range of motion.

A Culture of Self-Medication

The Egyptian medicine cabinet is filled with antibiotics, tranquilizers, pain medication, and an assortment of vitamins. You find that neighbors and friends tend to share medication and home remedies like herbs and compresses. As a child I remember being given boiled mint leaves for stomachache, a concoction of boiled cumin for gas, and boiled caraway and a tablespoon of honey for coughs. Many Egyptians traveling to the United States may bring their own drugs and remedies from home since U.S. law restricts the use of prescription drugs. As a health care provider, delicately ask about any regular medication the patient may be taking to include herbal concoctions and for how long.

Faith and Medicine: Commonly Held Medical Beliefs

Folk beliefs can be very strong when it comes to assessing the mental and physical patient. We have read cases of Christian Scientists refusing blood transfusions and a plethora of other medical morale dilemmas. Among Egyptians there is a belief in the healing powers of shrines, holy men, and saints; some of these beliefs are remnants of pharaohnic beliefs that still permeate rural areas of Egypt and are masked under tradition or religion.

One of the more prevalent beliefs is the evil eye, which is responsible for personal misfortune and illness. This evil eye is cast when a person boasts of achievement without invoking the name and blessings of God. The spirit known as The Jinn, where we get the English word Genie, may possess a person and cause ill health. I am certain our Navy/Marine Corps medical team in Haiti can give us examples of folk medicine and voodoo remedies based on ancient customs and woven into religion.

Perceptions of Pain and the Miracle of Western Medicine

You will also find that Egyptians tend to be more reserved about their pain in front of strangers and health care professionals. When they are among family members they become more expressive with grunting and guttural sounds. Verification of pain intensity tends to be difficult. We saw this whenever the Egyptian chief was around friends or superiors. Egyptians also generalize their pain even when it is localized and use metaphors like fire, rocks, and cold to describe pain.

From a psychological perspective, any psychosocial therapy comes with a stigma, and the advice of family or trusted friends is often solicited. Placing the blame externally and the communal nature of the region causes public shame to be a motivator rather than guilt.

People in developing countries put a lot of faith in Western medicine and will shop around for the doctor that offers the most optimistic prognosis. Scientific treatments that are seen as direct intervention are what please most Egyptians. Changes to lifestyle are not considered a good

option unless scientifically supported. There is no sanction for blood transfusion or receiving an organ transplant. However, an autopsy may be problematic for rural Egyptians who maintain a subconscious belief in the afterlife and the need to be buried intact.

Using ancillary experts like podiatrists and physical therapists are alien to most Egyptians, and there is a reluctance to seek care from anyone but a physician. It is important for the attending physician to sanction the use of ancillary members in front of the patient to avoid any problems resulting from lack of cooperation or a perception the doctor does not care about the patient's condition.

The gender of the doctor is a factor depending upon the generation of Egyptian you are dealing with. Egyptians are also use to dealing with Egyptian doctors who make diagnoses with limited resources. The patient may perceive the many routine tests as a lack of experience on the doctor's part.

Overall, Egyptians are in awe of American medicine and its technology and usually have a very high expectation of the abilities of Western doctors.

Conclusion

I hope this discussion of Egyptian culture and how it intertwines with curative procedures demonstrates the importance of a patient's beliefs and culture. I would like to thank the health care professionals of Naval Hospital Jacksonville for giving me the opportunity as a junior logistics officer to be part of this patient-care episode. As we shift to more multinational operations around the globe, we will be dealing more frequently with forces from allied nations. The Navy offers unique opportunities to use our Navy's diversity to enhance the treatment of foreign patients in your care whether ashore or at sea. □

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Local Chicago High School Dedicates Computer Lab to Navy Nurse

Last year Navy medicine lost LCDR Catherine L/G. Segni, NC, to bone cancer. The North Chicago, IL, native was remembered as an officer with a passion and dedication for teaching and improving corpsmen and junior officers of all corps. Her legacy lives on, as last week St. Benedict's High School in Chicago opened the Gilger-Segni (Gilger was LCDR Segni's maiden name) Computer Lab to honor the Navy Nurse Corps and a former graduate of the school. CAPT Elaine C. Holmes, MC, commanding officer of Naval Hospital Great Lakes, IL, along with CAPT Deborah Gray, NC, director for nursing services, attended the dedication.

Accompanying the senior officers were LCDR Kathy Morris, LT and Mrs. Douglas Senello, LT and Mrs. Charles Klein, LT John Smetak, and LT Raymond Garay, all nurses who served alongside LCDR Segni in various duty stations during her 10 years of active naval service.

Mr. Enrique Segni said of his late wife, "LCDR Segni was immensely proud for her association with the Navy Nurse Corps, and we wanted to do something that reflected her dedication to hard work and education." Mr. Segni teamed up with his church, community, and LCDR Segni's best friend and classmate, Mrs. Mary Knepper to organize a year-long fund-raiser.

The Gilger-Segni Technology Fund raised \$15,000 that allowed for the purchase of 35 state-of-the-art computers for St. Benedict's High School. The Gilger-Segni Computer Lab was opened on the second floor of the school amidst Navy nurses, students, alumni, and members of the community. RADM Kathy Martin, director of the Navy Nurse Corps, sent a letter of dedication which was made part of a display honoring the late naval officer and alumni of St. Benedict's High School. RADM Martin focused on the contributions LCDR Segni made and in particular the Navy members she touched in her 10 years of active service. Father Bob Heidenreich, interim president of Saint Benedict's School and himself a former Navy chaplain gave the benediction citing the benefits future generations of students will derive from the Gilger-Segni Computer Lab.

After the ceremony students mingled with Navy nurses who talked to them about their Navy careers. But some students couldn't wait to surf the net and take advantage of the information super highway. The Navy is more than just a career; it is also a lifetime of memories and service not only to the nation but to the community in which Navy members thrive.

—Story by LT Youssef H. Aboul-Enein, MSC, USNR, Plans, Operations and Medical Intelligence Officer, Naval Hospital Great Lakes, IL.



Building 1, National Naval Medical Center, Bethesda, MD, the present home of the Naval Dental School

The Naval Dental School: 75 Years of Excellence in Education

CDR Duane R. Schafer, DC, USN

"To broaden the knowledge of dental officers, increase their proficiency, and to acquaint them with the latest advances in dentistry."

It was with these aspirations that the U.S. Naval Dental School opened its doors on 3 Feb 1923. Seventy-five years later the school remains the premiere institute for post-graduate dental education and training in the world.

Established as part of the U.S. Naval Medical School, on the campus of what is now the Bureau of Medi-

cine and Surgery, the inaugural staff consisted of three dental officers. LT J.J. Haas, LCDR H.E. Harvey, and LCDR W.L. Darnell were tasked with the mission of providing advanced dental instruction to officers of the Dental Corps, training specially detailed hospital corpsmen to serve as dental assistants, and qualifying a number of these hospital corpsmen as dental hygienists. In addition, the school's staff was responsible for providing a working laboratory for the fabrication of prosthetic appliances and furnishing dental services for the

Naval Hospital, Washington, DC. In preparation for their new assignment as instructors, LT Haas and LCDRs Harvey and Darnell garnered additional training at the dental schools of Northwestern University and Columbia University, as well as the U.S. Naval Medical School.

The initial class selected to "commence studies" at the U.S. Naval Dental School consisted of five dental officers. Those enrolled included LT L.W. Baker, LT W.C. Carroll, LT A.W. Chandler, LT R.S. Davis, and LTR.H. Fladeland. The General Post-

graduate Course was to last 4 months with students meeting 5 1/2 days per week. Their curriculum included bacteriology, dental prosthesis, clinical dentistry, preventive dentistry, dental radiology, minor oral surgery, general pathology, hematology, metallurgy, as well as general Medical Department duties.

Of particular interest was the inclusion of preventive dentistry in the core studies, putting the Navy Dental Corps at the forefront of this emerging field of study. The Surgeon General went so far as to acknowledge the Naval Dental School's concern for its patients' oral health and initiatives on disease prevention in his annual report, stating, "the wide dissemination of knowledge regarding the need for oral hygiene and care of the dental mechanism is, no doubt, partly responsible for the interest manifested by naval personnel in their oral health. This increased interest results in making greater demand for the services of dental officers."

On 16 June 1923, 2 weeks following the graduation of 11 corpsmen from the dental assistant school, the first class of dental officers was graduated. By the mid-1920's, two 4-month courses were convened at the Naval Dental School each with five officers completing their studies. The school had strengthened and standardized its teaching and treatment methods for both the officers and dental technicians. New equipment and new medicinal preparations had been "given trial" under the exacting conditions of the school clinic prior to adoption for general use. Specifications for new dental instruments and prosthetic ap-

pliances were written in addition to the testing of new dental materials. This latter testing was the first of many cooperative ventures between the Naval Dental Corps and the National Bureau of Standards.

When it opened its doors, the school's physical plant, which included a total of five dental operatories and a 20-man prosthetic laboratory, was described as having the "finest equipment of any dental institution in the United States." And except for the period from 1932 to 1936, when the school was closed due to economic reasons, it continued to accommodate postgraduate classes of up to 20 dentists and 42 dental technicians annually. However, by the late 1930's, the dental facilities which were described as poorly insulated and uncomfortably

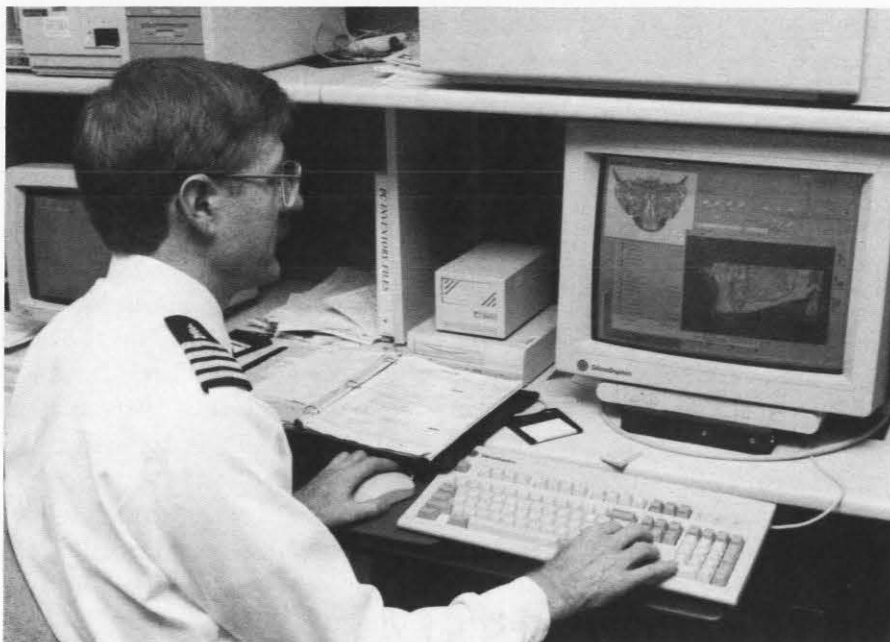
warm in the summer months had begun to show their age. Much of the equipment on hand was war-dated material which had been reconditioned through the Naval Medical Supply Depot, Brooklyn, NY.

In 1937 the 75th Congress provided the much-needed authorization to construct a facility to house the Naval Medical Center and Naval Dental School complexes. Ground was broken in the summer of 1939 on a 230-acre tract of land in Bethesda, MD, and on 29 Dec 1941 the U.S. Naval Dental School moved to its new home in the National Naval Dental Center, occupying two floors in the north wing of the main building.

With the new building, a staff of seven dental officers and equipment of the "latest design," the Naval Den-



Hands-on mentoring and teaching of students allow current and future dental specialists to receive unparalleled advanced dental education.



The school pioneered software development for 3-D radiographic imaging of head and neck diseases.

tal School was once again on the cutting edge of dental education. Over the next decade the school's role expanded to include indoctrination training for all newly commissioned officers, prosthetic lab technician training for hospital corpsmen, a 16-week dental repair course, and 6-month specialized courses in oral surgery and prosthodontics.

As the school enlarged in the late 1940's part of the staff moved into a "temporary" building, Building 122, a facility which would serve the school for over 40 years. The full-time faculty was increased to 18 in an effort to meet mounting educational demands and to meet the needs of an ever-increasing number of patients.

By 1953, 47 dentists were enrolled in and successfully completed various 6-month residency/postgraduate courses. The Naval Dental School served as the educational hub for a corps of 1,784 dental officers that was providing over 7.5 million dental procedures annually.

By the mid-1960's, the 1,800 dental officers on active duty were performing nearly 12 million dental procedures

annually in all corners and oceans of the world. These figures included treatment for eligible beneficiaries and the delivery of nearly 1 million three-agent stannous fluoride applications.

The continued effects of the Naval Dental School's educational mission and disease prevention efforts also reached far beyond its Bethesda campus. The film, *Preventive Dentistry I: The Prevention of Oral Disease*, was awarded the *Diplome d' Honneur* by judges of the Third International Dental Film Meeting held in Paris, France.

The school developed and administered a Military Provincial Health Program for dental care providers to familiarize them with Vietnamese culture and environment. Postdoctoral fellowship programs in biochemistry and dental materials were established in cooperation with the Dental Research Facility, Great Lakes, IL, and the National Bureau of Standards, respectively.

The General Postgraduate Course was redesigned to allow dental officers to compete academically in the Graduate School of Georgetown Uni-

versity, and the first joint exhibit produced through the combined efforts of the U.S. Army, Air Force, and Navy was shown at the annual session of the American Dental Association in Las Vegas, NV.

As the decade came to a close, the Naval Dental School received full accreditation from the Council on Dental Education on the American Dental Association for its advanced dental specialty programs in endodontics, periodontics, oral pathology, prosthodontics, and oral surgery.

The 1970's and 1980's signaled the beginning of what has been a gradual decline of the end strength of the Dental Corps. The school, however, now renamed the Naval Graduate Dental School, continued to prosper. It entered into an agreement with The George Washington University (GWU) whereby the university would confer the degree of master of science in oral biology for courses conducted as part of the Navy graduate program. In addition, the staff members could enroll in off-campus studies through GWU leading to a master of arts degree in education.

A Personnel Exchange Program between the navies of the United Kingdom and the United States resulted in a Royal Navy dental officer being assigned to the school. Dental specialists from Bethesda participated in a then unique "two-way closed circuit television link" via earth satellite with the hospital ship SS *Hope* at Maceio, Brazil, conferring with a group of Brazilian dentists.

The educational curriculum was expanded to include a 2-year residency program in comprehensive den-

Advances such as the air-driven turbine handpiece and state-of-the-art infection control practices assure the patient world-class oral health care.

tistry, management seminars for dental officers aimed at both finance and total health care delivery, courses in four-handed dentistry, a 1-year program in advanced clinical dentistry, and quality assurance seminars. The school was also instrumental in the implementation of a dental curriculum within the medical studies at the Uniformed Services University of Health Sciences (USUHS). The post graduate school was the sponsoring institution for a triservice symposium on "AIDS in Dentistry" in April 1986 and later that same year it was the site for the Navy's first use of the osseointegration system of implants.

The spring of 1987 marked the completion of the construction project to retrofit the spaces within Building 1 to consolidate the Naval Dental School from five aging facilities into one contiguous building and to house the Headquarters, Naval Dental Clinic, Bethesda.

Over the years the Naval Dental School staff has been involved in numerous cooperative programs with our medical and civilian colleagues. In 1944 the acrylic eye was developed by a team of dentists led by CAPT R.D. Pitton following a request from the Chief of the Eye, Ear, Nose and Throat Department, U.S. Naval Hospital Bethesda. A few years later an aesthetic and functional hand was developed by Naval Dental School staff in conjunction with the Naval Ordinance Laboratory. The pioneering research and fabrication of the air turbine dental handpiece, ultrasonic dental instruments, and freeze-dried bone-grafting biocompatibility studies were all performed at the school.



Current research efforts focus on the development of state-of-the-art dental restorative materials, perfecting both soft tissue and bone-grafting techniques, uncovering the molecular biological aspects of oral disease, and defining new maxillofacial pathologic entities.

Today, the Naval Dental School remains the axis of the education and training programs of the Navy Dental Corps. With a staff of 30 board-certified dental officers, a Nurse Corps officer, a clinical psychologist, 90 enlisted personnel, and 13 civilian employees, it serves as host for residents representing all branches of the armed services.

Its residency programs are conducted through cooperative ventures with USUHS, the Armed Forces In-

stitute of Pathology, Walter Reed Army Medical Center, Children's Hospital, GWU, and Indiana University. In addition, the school sponsors 25 continuing education courses attended by nearly 1,000 dentists annually, 12 correspondence courses, and a videotape catalog on 19 dental-related topics.

Not content to rest on its laurels, the Naval Dental School is prepared to face the challenges of the new millennium. Its mission remains undaunted: provide the highest echelon of dental education for its corps so as to maintain the high standards in oral health care for the fighting men and women of the United States Navy. □

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Navy Medicine Research and Development Highlights

●Navy Medical Research and Development Laboratory System Reorganized

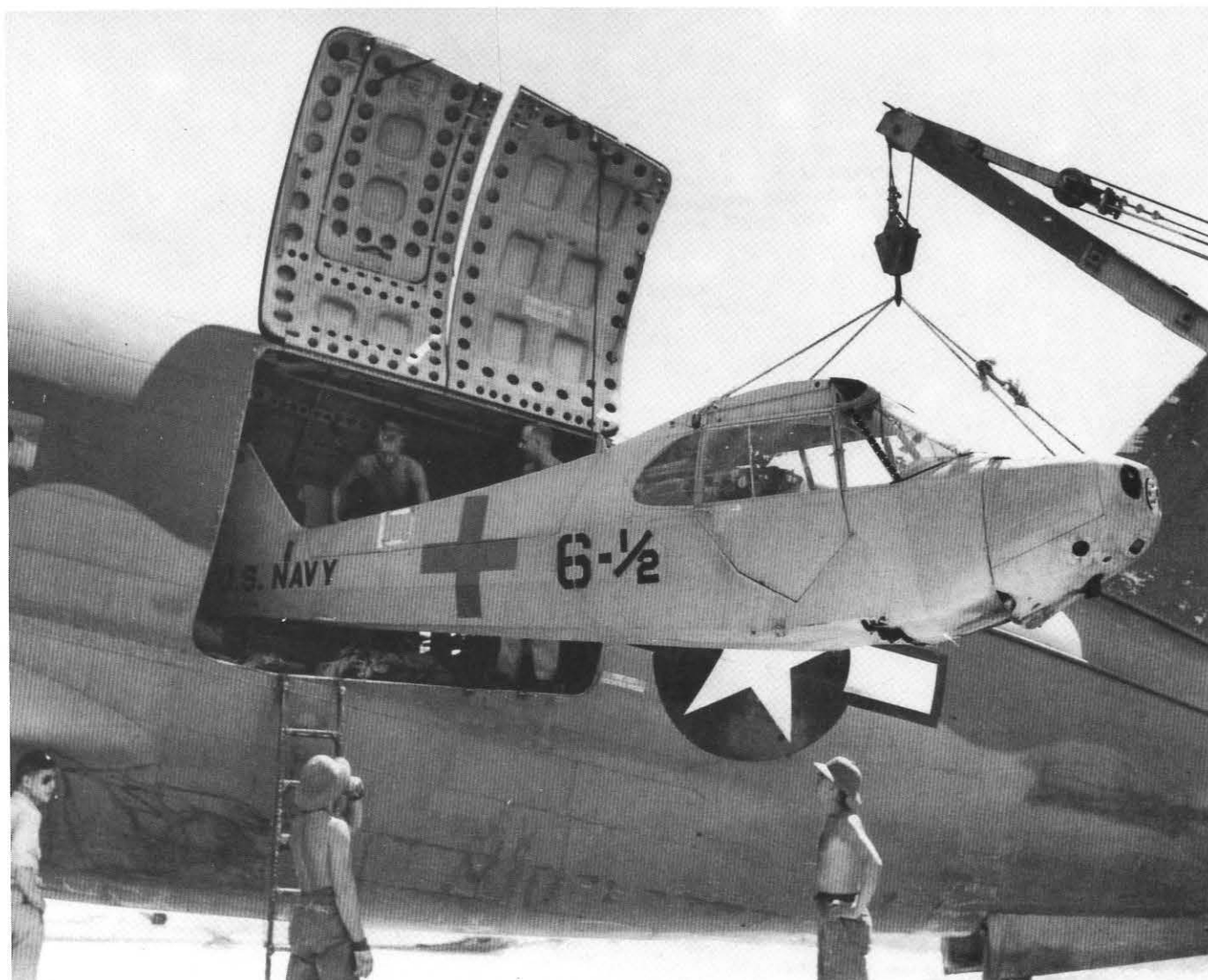
The Naval Medical Research and Development Command, Bethesda, MD, was officially disestablished effective 1 Oct 1998. The Naval Medical Research and Development Division (MED-26), Bureau of Medicine and Surgery, Washington, DC, assumed the headquarters functions. In the reorganization, all Navy medical research and development laboratories remain unchanged and fully operational. Navy scientists will continue to conduct basic, clinical, and field research directly related to military requirements and operational needs. Current studies will focus on military recruits, special training groups, and personnel in the surface, submarine, air, and amphibious warfare communities. The Naval Medical Research Center, Bethesda, MD, is now a headquarters laboratory and provides oversight and support to four subordinate laboratories: Naval Medical Research Center Detachment, Lima, Peru; Naval Medical Research Unit No. 2, Jakarta, Indonesia; Naval Medical Research Unit No. 3, Cairo, Egypt; and the Naval Dental Research Institute, Great Lakes, IL. In addition, the Naval Health Research Center, San Diego, CA, is also now a headquarters laboratory providing oversight and support to four subordinate laboratories: Naval Submarine Medical Research Laboratory, Groton, CT; Naval Aerospace Medical Research Laboratory, Pensacola, FL; Naval Health Research Center (Toxicology) Detachment, Dayton, OH; and Naval Health Research Center (Electromagnetic Radiation) Detachment, San Antonio, TX. Navy medical research facilities equal those at modern academic and industrial institutions. In addition, research is supported in other Navy laboratories as well as in partnership with the Army and Air Force and with other federal agencies. Research in nongovernment laboratories is promoted through an active collaborative research and technology transfer program that develops cooperative research and development agreements with universities and private industry to ensure that research products developed by the Navy benefit the entire country. MED-26 is committed to providing the biomedical research needed to enhance the health, safety, and well being of the men and women of the

Navy and Marine Corps during their peacetime and contingency missions. For more information on MED-26 visit the homepage at <http://support1.med.navy.mil/bumed/med-02/med-26/nmrdc/>.

●DNA Vaccine

Vaccines are among the most cost-effective methods available in health care. Conventional vaccines use disabled or killed infectious organisms, or proteins specific to them, to generate an immune response. Yet, scientists haven't developed effective vaccines against a variety of the most common infectious diseases in the world such as malaria, AIDS, dengue fever, and tuberculosis, or highly fatal diseases such as Ebola hemorrhagic fever and Lassa fever. DNA vaccines may be a solution. A Navy-led team of military, academic and industrial scientists successfully tested a DNA vaccine in healthy people. Using malaria as a model, Navy researchers from the Navy Medical Research Center (NMRC) and their collaborators demonstrated that a DNA vaccine could be effective. DNA vaccine development technology uses a revolutionary new approach that may overcome the technical limitations of conventional vaccines and offers advantages in safety, efficacy, and cost. A typical human cell contains thousands of different proteins essential to cell structure, growth, and function. Proteins are produced by the cell according to genetic instructions encoded by the DNA of the cell. DNA is organized into segments called genes, with each gene containing the information required to produce a specific protein. Normally, human genes in human cells produce human proteins, which cause a desired biological effect. If foreign genes are introduced into human cells, they produce foreign proteins. The body's immune system, in turn, produces antibodies to the foreign proteins. Stimulation of an immune response through the introduction of foreign genes and the production of foreign proteins is the basis of DNA vaccines. The success of NMRC's study validates the use of DNA vaccine technology, a crucial step forward in vaccine development. For more information on NMRC infectious diseases research efforts visit the homepage at <http://www.nmri.nmrc.navy.mil>.

Navy Medicine 1944



BUMED Archives

Crew unloads one of two HE-1 Cub ambulances from a R5C Curtiss Commando transport at Peleliu following its arrival from Guam. The 1,200-pound aircraft was shipped in sections and reassembled after delivery. The HE-1 had a length of 22.5 feet and a wing span of 35.5 feet. Powered by a 100 h.p. Lycoming engine and carrying 20 gallons of gasoline, it had a maximum speed of 99 m.p.h., a range of 424 miles, and a service ceiling of 16,000 feet. Hinged at the top front just behind the wing, the upper fuselage folded back and a single litter could be secured in place. This aircraft could rapidly evacuate casualties from forward airstrips and other locales where larger ambulance planes could not be used and time was critical.

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